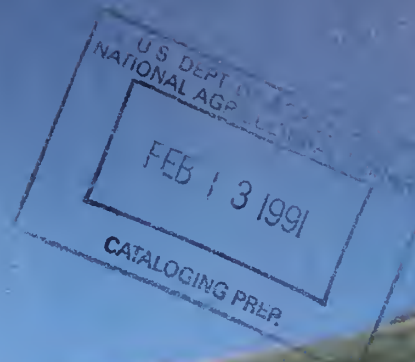
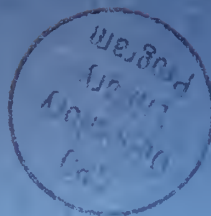


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# Conserving Endangered Species

A Commitment to the Future



United States  
Department of  
Agriculture

PREPARED BY  
Forest  
Service

Southwestern  
Region



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An open letter from Regional Forester David Jolly:

On behalf of the Forest Service employees in the Southwestern Region, I wish to express our commitment to conserve all plant and wildlife species on the national forests and grasslands of our region. We're committed to the recovery of all threatened and endangered species on national forests and grasslands in the Southwest.

Because of the unique and varied ecosystems in the Southwest, the national forests and grasslands in Region 3 contain numerous threatened, endangered, and sensitive plant and animal species. The national forests and grasslands in the Southwestern Region serve as a refugium for many of these species. Of the 56 federally listed threatened or endangered species in New Mexico and Arizona, 50 also inhabit land managed by the Forest Service. Our agency has an urgent, compelling responsibility to maintain the Southwest's remarkable wildlife heritage.

As stewards of the habitat of many threatened, endangered, and sensitive species, I'm excited about the opportunity we have to provide an environment where they can survive.

As we head into the 1990s, we must be willing to try new approaches and forge new partnerships to ensure the survival of all species. I see the 1990s as a time of great success and accomplishment for the threatened, endangered and sensitive species program. I see it as a time when the Forest Service will manage all species so their full value and intrinsic benefits are achieved and protected for future generations.

The threatened, endangered and sensitive species program is a story whose final chapter has not yet been written. As we work to create a more secure future for all species that live in our national forests and grasslands, I invite you to join us in creating an environment where these species—plant and animal alike—will flourish.



DAVID F. JOLLY  
Regional Forester  
Southwestern Region

*Cover Photo:  
Latir Mesa,  
Carson National  
Forest.*

*Inset on Front  
Cover: The  
large dark eyes  
and heavily  
barred and  
spotted under-  
parts separate  
the spotted owl  
from any other  
owl.*

*Inset on Back  
Cover: Hanfer  
Wash Research  
and Natural  
Area, Arizona.*

Few areas in the United States contain the range of contrasts found within the Southwestern Region. Within an elevation range below 1,500 feet to above 13,000 feet, the complex topography, rainfall patterns and soils combine to provide a myriad of habitats for several thousand different plants and nearly a thousand animals.

Situated at the southern end of the Rocky Mountains, the Region has numerous small mountain ranges. Many of these mountain islands have been evolutionarily isolated from one another, permitting development of unique gene pools and species assemblages. They are refugial reflections of past climates.

The Region is the meeting place of numerous geographic regions from the Great Basin to the Sierra Madre. Their influence is seen in the composition of plant and animal communities from the frigid heights of the alpine to the sunbaked stretches of the Sonoran desert. The breadth of genetic, species and community diversity in the Southwestern Region presents a monumental management challenge.



*Big Canyon Drainage, Guadalupe Mountains.*



## Introduction

The Southwestern Region has cooperated for many years with the Arizona and New Mexico Game and Fish Departments and with the U.S. Fish and Wildlife Service. In more recent years this cooperation has been productive in protecting threatened and endangered species. The Apache trout, Rio Grande cutthroat trout, Gila trout, and Gila topminnow are among the species that have benefited from this attention. The peregrine falcon, Kaibab squirrel and Southern bald eagle have responded remarkably well to special management.

Despite the tremendous increases in the kinds and intensity of public use of national forests, most plants and animals have not only co-existed with people, but have flourished.

The Southwestern Region has had many champions for wildlife and habitat who have made tremendous contributions to conservation on a regional and national level. Perhaps none best typifies these champions better than Aldo Leopold. In July 1909, Leopold arrived in Albuquerque fresh from his studies at Yale. Like many, he had equated control, even extermination of wolves, mountain lions, and coyotes with

a flourishing deer herd. He recalled a timber cruising expedition during which he and his companions saw a she-wolf swim across a river and join her cubs on the other side. At once they seized their rifles and pumped lead into the pack until the old wolf was down. His next thoughts helped guide his future actions as an advocate for all wildlife.

*"We reached the old wolf in time to watch the fierce green fire dying in her eyes. I realized then, and have known ever since that there was something new to me in those eyes—something known only to her and the mountain. I was young then and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view."*

The concept of thinking like a mountain intrigued Leopold. Given the fragile balance of the southwestern ecology, he began to realize that

decisions made by his generation would greatly affect the options available to his descendants.

## Wildlife Values

Plants and animals are the result of millions of years of history. Each is the repository of an immense amount of genetic information. We depend on our fellow species in countless ways for our material welfare and ultimately for our future survival. The ultimate value of each species is beyond measure. The continued existence of wildlife species needs no justification. We have a moral responsibility to save all species. In most cases, we are directly or indirectly responsible for them becoming endangered.

The values attributed to wildlife are quite diverse. Consider the following values wildlife possess, realizing others exist:

**Aesthetics**—Plants and animals are enjoyable to see, photograph, paint or talk about. We gravitate toward other forms of life as moths to a light. We turn unconsciously to other organisms for a sense of kinship and religious symbolism. The loss of even a single species represents a great aesthetic loss for the entire world. Unlike a creation of art, the evolution of a single species is a process that can never again be duplicated. Each contributes to opportunities for a richer more diverse life experience.

**Historical**—Many species were instrumental in the settling of our country, such as the beaver, river otter and fur seal.

**Recreational**—People enjoy many recreational pursuits centered around wildlife, ranging from flower identification and photography to bird watching.

**Commercial**—Many wildlife species have little or no known economic value. Our conservation ethic should not be based on economic value. However, many wildlife do have a tremendous commercial value. The dollar amounts are impressive when one considers the total income derived from hunting, fishing, bird watching, feeding, mushrooming and other activities. We use hundreds of products each day that owe their existence to plants and animals.

**Educational**—We learn many things about nature and ourselves through wildlife observation. By understanding wildlife, we understand ourselves better since we are all part of the same environment.

**Ecological**—Humans, plants and animals all belong to the same natural system. We are all interdependent in many subtle ways. When a species becomes extinct, the ecosystem becomes less complex. The loss of a single plant species can cause the extinction of 10-30 dependent insect species. Thus, it is important to maintain ecological diversity. That means preserving all of the plants and animals that are part of the ecosystem.

Plants and animals also act as environmental health indicators. They inform us of the health and quality of our environment.

**Scientific**—Wildlife already has a tremendous scientific value to humans and we haven't explored all of the benefits.

When we get a prescription filled at the pharmacy, there's a 50 percent chance the medication we pick up owes its origin to "startpoint" materials from wild organisms.

There are about 80,000 species of edible plants but fewer than 20 produce 90 percent of the world's food. Modest amounts of research have revealed many among these that are potentially superior to the few plants upon which we now rely on.

In 1960, a child suffering from leukemia had only a 20 percent chance of remission. Now, thanks to drugs prepared from a tropical forest plant, the child has an 80 percent chance.

There are numerous other examples of how plants and animals are of value to mankind and yet, there are many more unknown benefits. We cannot discover those secrets and help humankind if wildlife become extinct.



# Endangered Species Act

The most important wildlife legislation in history, our nation's Endangered Species Act, represents our commitment to saving the animal and plant species that enrich our lives. The Endangered Species Act was passed because we as a nation care about plants and animals. We realize that once a species becomes extinct, it will never come back and we ourselves are diminished.

The Endangered Species Act established a comprehensive program to conserve plant and animal species that are endangered (in danger of extinction) or "threatened" (likely to become endangered in the foreseeable future). Any species or subspecies may be eligible for listing and protection. An important aspect of the Act is public participation, which may include helping to identify species that need protection.

## Basic Provisions of the Endangered Species Act

Once a species is listed, its chances for survival are improved because of the Act's provisions for conservation and recovery. They include:

- Controls on taking (killing, capturing, and harming) and trade.
- A requirement that federal agencies not jeopardize species existence or damage their critical habitat.
- A directive for federal agencies to administer their programs in ways that will enhance survival of listed species.
- Procedures for federal and state cooperation in conservation and recovery programs.

## Listing

Once a species is listed, agencies, organizations and individuals must consult with the Fish and Wildlife Service before any federally assisted action modifies a listed species' habitat or when individuals of the species might be taken. Listing also includes the application of restrictions in the trafficking of such species. Finally, listing leads to the creation of a plan for recovering species and facilitates acquisition of land to assist recovery.

Candidate species for listing are identified by the U.S. Fish and Wildlife Service or are brought to its attention by petition. The Candidate Category 1 List (now totaling about 950 U.S. species) includes those species, subspecies or populations for which existing data support official listing as either threatened or endangered, but which have not been listed due to lack of priority or inadequate resources to complete the formal listing process. Candidate Category 2 includes species, subspecies or populations for which the existing data are considered inadequate to make a listing decision.

## Recovery Plans

With the help of a team of experts, recovery plans are prepared to guide work on behalf of listed species. Recovery plans include site-specific management actions needed to assure conservation and survival of the species and measurable criteria that when met, would result in removal of the species from the list. Estimates of time and funding required to carry out and achieve the plan's goals are also given.

## Consultation

Once a species is listed, all federal agencies must consult with the U.S. Fish and Wildlife Service so that federal actions will not harm listed species or their critical habitat. There are two categories of consultation—formal and informal consultations. Informal consultation is designed to resolve potential conflicts during the project's earliest planning stages. If it is determined the proposed action "may affect" a listed species, formal consultation is initiated. Under formal consultation, the Fish and Wildlife Service prepares a biological opinion on the proposed project's effects on the listed species, its critical habitat and on whether the actions jeopardize it. If a "jeopardy" opinion is given, the Service identifies "reasonable and prudent" alternatives so that adverse impacts on listed species and their critical habitat are avoided.

## Current Listing Status (as of May, 1988)

U.S. Endangered	377
U.S. Threatened	118
Total U.S. Listed	495
Approved Recovery plans	229

The rapid disappearance of this plant across its wide-spread range led to its placement on the Southwestern Region's sensitive species list. This lily is found scattered in small populations in northern New Mexico with a few isolated individuals known from the Lincoln National Forest in southern New Mexico. The woodlily prefers wetter sites in mixed-conifer forests with a lush under-

## Western Woodlily *Lilium philadelphicum*



story. It is often associated with large aspen, douglas-fir or ponderosa pine trees, or, less frequently, along streams or in meadows. Hummingbirds normally pollinate the bright orange-red flower but during drought years, the flower is self-pollinating, ensuring seed production.

*The bright orange-red woodlily is pollinated by hummingbirds.*

This brightly-flowered and multi-stemmed cactus is listed as a federally endangered plant under the Endangered Species Act and is restricted to a small area in central Arizona. Potential mining threats were the primary impetus for listing the cactus as endangered. However, habitat with a good population of the cactus

## Arizona Hedgehog Cactus *Echinocereus triglochidiatus* var. *arizonicus*



was included in the newly expanded Superstition Wilderness. Contrary to logic, the bright red flowers are easily seen only from a short distance, making it difficult to survey the steep, rocky hillsides where it is normally found.

*The endangered hedgehog cactus is restricted to a small area in central Arizona.*

This hardy member of the sunflower family is listed as a federally threatened plant under the Endangered Species Act. It occurs only on the San Francisco Peaks of northern Arizona on open, rocky slopes in the alpine zone. The San Francisco groundsel colonizes bare areas. The mother clone expands mostly by establishing new plantlets from nodes on the roots. Normal soil

## San Francisco Groundsel *Senecio franciscanus*



movement from actions such as freezing and thawing break the clones into small segments that in turn spread to other areas. Concern over the effects of erosion caused by high levels of recreation use on fragile, steep alpine slopes led to placement of the groundsel on the threatened list.

*The San Francisco groundsel occurs only in the San Francisco Peaks of northern Arizona.*



The Gila trout is a federal endangered species. Native to the Verde River drainage of Arizona and the Upper Gila Basin of New Mexico, this trout inhabits small, cool, clear, well-shaded mountain streams. Deep pools are important for the survival of the fish during droughts. Competition and hybridization with non-native (introduced) trouts are primary reasons for their elimination in much of their former range.

## Gila Trout

*Salmo gilae*



Overgrazing and logging have also contributed to their decline. In the summer of 1989, lightning-caused wildfires damaged several key habitat areas of the Gila trout. A rescue effort saved many, which were then packed out by horse and transplanted to other areas providing suitable habitat.

*The Gila trout requires cool, clear, well-shaded mountain streams with large pools for survival.*

This dark brown, brownish-green toad is the Southwest's largest anuran (toad or frog). It has smooth skin with large warts on its hind legs. It ranges from southeastern California to southwestern New Mexico. The Colorado River toad is primarily a Sonoran Desert species. Its diet includes beetles, spiders, lizards and even other toads such as the Couch's spadefoot. The breeding season corresponds with spring and summer rains. When molested they assume a butting pose—with the parotid

## Colorado River Toad

*Bufo alvarius*



gland (the large gland located directly behind the eyes) directed toward the intruder. The gland secretes a powerful toxin strong enough to paralyze large dogs and other animals. Water for breeding (which can be affected by diversion, rapid runoff and pollution) is probably the most critical factor limiting species distribution. The Colorado River toad is a New Mexico Endangered Category 2 species.

*The Colorado River toad is primarily a Sonoran desert species.*



The Jemez Mountains salamander is a candidate species for listing Category 2. It is a member of the lungless salamander family (*Plethodontidae*) and breathes through its moist skin. It is a slender, delicate-looking salamander with small legs. Adults are dark brown in color with a subtle, fine, brassy stippling on their backs. The Jemez Mountains salamander is endemic (restricted) to the Jemez Mountains in north central New Mexico. Typically, it occurs in areas dominated by spruce, fir, maple and aspen in elevations between 7,200 to 9,200 feet, and in steep, north-facing slopes. They spend much of the year underground and come to the surface during the wet summer

## Jemez Mountains Salamander

*Plethodon neomexicanus*



rains (June through August). During summer months, they can be found under rocks, in decayed fallen logs, and in moist litter and soil. Talus slopes are also an important cover type. Habitat alterations that create drier conditions are the major threat to this species. Tracts of suitable habitat have been given special management designation for the conservation of the Jemez Mountains salamander. Areas with suitable Jemez Mountains salamander habitat are surveyed and those areas with significant populations are protected from disturbance.

*The Jemez Mountains salamander is endemic (restricted) to the Jemez Mountains in north central New Mexico.*

The Gila monster is readily distinguished by its stout build, large size and unique pinkish-blackish color. Its dorsal surface is covered with small, round, bead-like scales. This species ranges from southeastern California, southern Nevada, and southwestern Utah to southwestern New Mexico. It and the beaded lizard of Mexico are the only known poisonous lizards in the world. The poison glands are located in the lower jaw. Grooved teeth in both jaws inject the venom, which is worked in by chewing. The venom is a neurotoxin and its main function appears to be defensive.

## Gila Monster

*Heloderma suspectum*



The Gila monster typically inhabits the lower slopes of mountains and nearby outwash plains.

They dig burrows for shelter or use those made by other animals. Their prey consists of lizards, snakes, small mammals and the eggs of birds and reptiles. Collection for the "pet" trade has been a serious problem for the Gila monster.

The Gila monster is less widespread and abundant than it used to be and is a candidate species for federal listing.

*The Gila monster typically inhabits the lower slopes of mountains and nearby outwash plains.*



## Mountain Skink *Eumeces callicephalis*

Skinks differ from other lizards in their smooth, shiny appearance. The mountain skinks upper body is olive in color, often with a bluish tinge to the tail. It occurs from southeastern Arizona to southwestern New Mexico. Occurring in a wide array of habitats in the upper Sonoran and transition life zones, they spend most of their time in leaf litter, under rocks, and



vegetation. They are more dependent on moisture than other lizards. The species is very localized where it does occur. Vegetation manipulation and wildfires are the most serious threat to this lizard, which is a candidate for federal listing.

*The brightly colored mountain skink spends most of its time in leaf litter and under rocks.*

## Green Rat Snake *Senticolis triaspis*

A slim greenish-gray, or olive snake with whitish or cream underparts. It is primarily a mountain dweller that frequents wooded, rocky canyon bottoms near streams. It occurs in chaparral, woodland and thornscrub and spends much of its time during the day in trees and shrubs where its green color and slender form help conceal it from



predators and prey. It feeds on rodents, lizards and birds. The green rat snake is listed as State Endangered Group 2 in New Mexico.

*The green rat snake spends much of its time on shrubs and trees. Its color and slender form help conceal it from predators and potential prey species.*

## Mottled Rock Rattlesnake *Crotalus lepidus*

The rock rattlesnake is distinctive in its grayish or greenish dorsum (back), marked by regularly spaced, dark crossbands. It occurs from southeastern Arizona and southern New Mexico southward into Mexico. The rock rattlesnake is primarily a mountain dweller but also occurs in bordering lowlands. As the name suggests, it favors areas of boulders and rocks.



Prey consists primarily of lizards, snakes and small mammals. Habitat protection is the prime consideration in conserving this species. It is on the New Mexico Endangered Group 1 list.

*As the name suggests, the rock rattlesnake favors areas of boulders and rocks.*



The American peregrine falcon is a federal endangered species. This moderate-sized falcon differs from its relative, the prairie falcon, in having a heavier malar mark ("moustache"), lacking the prairie falcon's contrastingly-dark axillar area ("armpit"), and having a grey-colored upper part rather than brown. In the Southwest, the American peregrine falcon breeds locally in mountainous areas. Their breeding territories center on cliffs that are in wooded or forested habitats with large "gulfs" of air nearby where these fast birds can capture their prey—other birds. Peregrines take virtually all

## American Peregrine Falcon

*Falco peregrinus anatum*



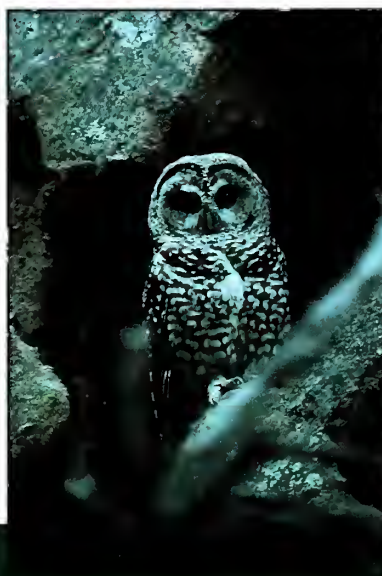
of their prey in flight, usually after a dive from above. Populations of this species dropped drastically with spread of the use of DDT in the 1940s. DDT has been found to cause eggshell thinning and reproductive failure, resulting in serious declines and losses of populations. At present, the small population in the Southwest appears to be stable. The major effort in the Southwestern Region is to identify and manage suitable habitat for breeding birds.

*In the southwest, the peregrine falcon breeds locally in mountainous areas.*

The spotted owl is a medium-sized owl with a round head and no "ear tufts." The large dark eyes and heavily barred and spotted underparts separate this owl from any other. Spotted owls are widely distributed throughout Arizona and New Mexico. On all forests, they appear to prefer forested areas containing dense, uneven-aged conifer stands with a closed canopy. It nests in cavities of large conifers, in platforms of sticks in mature or old-growth conifers and in small cliff ledges and cavities. Two or three eggs are usually laid. Woodrats are its most

## Mexican Spotted Owl

*Strix occidentalis lucida*



common prey. Harvest of mature and old growth conifer stands appears to be the most serious concern in managing the spotted owl. Special management guidelines that call for protecting their habitat when they have been confirmed in an area have been developed and are being implemented on all forests in the Southwestern Region.

*Spotted owl owlets showing juvenile plumage. Flight skills of owlets increase gradually throughout summer. Owlets are semi-independent by early September.*



Once thought to occur only in Alaska and Canada, the boreal owl has recently been confirmed in northern New Mexico. It inhabits high elevation Engelmann spruce-subalpine fir forests interspersed with meadows and other small openings. Boreal owls, like most species of owls, can be located using taped calls and eliciting responses.

## Boreal Owl

*Aegolius funereus*

The boreal owl is a sensitive species in Region 3.

*Once believed to breed only in Canada and Alaska, the boreal owl has recently been confirmed in northern New Mexico.*



## Elegant Trogon

*Trogon elegans*

Trogons are short-billed, long-tailed birds with brightly colored plumage. The male has iridescent green upper parts, head, and breast and red posterior underparts. The tail is copper-colored to greenish on its upper surface. In females, green and

*In the United States, the elegant trogon breeds in the mountains of southern Arizona (Santa Ritas, Huachucas, and Chiricahuas).*

red areas are replaced by shades of brown and pinkish red, respectively. The elegant trogon occurs from arid shrubland into the pine-oak woodland. In southeast Arizona, it is primarily confined to broad-leaf woodlands in montane canyons. It nests in tree cavities where it typically lays 3-4 eggs. The elegant trogon is in the Endangered Category 1 in New Mexico, and a state candidate species in Arizona.

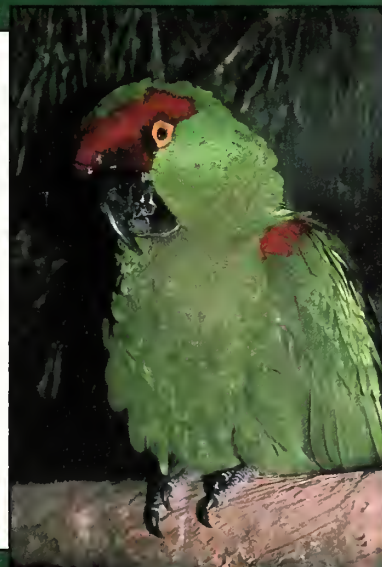
The thick-billed parrot is a federal endangered species. In the United States, it is restricted to southeastern Arizona and southwestern New Mexico. It occurs primarily in the ponderosa pine type but also utilizes pinon-juniper and mixed conifer forests. The thick-billed parrot depends on seeds from conifer cones for food. It has recently been confirmed to

## Thick-Billed Parrot

*Rhynchopsitta pachyrhyncha*

breed in the United States. A joint reintroduction effort in 1985 between the Arizona Game and Fish, U.S. Fish and Wildlife Service and U.S. Forest Service has resulted in apparent success.

*The thick-billed parrot feeds on seeds from conifer cones.*





A resident of central and southeastern Arizona, both the number of occupied roost sites and the number of individuals per colony have declined drastically. On Halloween 1988, the species was granted endangered species status. These bats feed mainly on agave and saguaro flower nectar and pollen. As a result, they leave a characteristic yellow stain on the rocks near cave roosts and on cave floors and walls. Threats to their survival come from

## Sanborn's Long-nosed Bat

*Leptonycteris sanborni*



the harvest of agave, especially in Mexico for the liquor industry, and from human disturbance of roosting colonies. Management objectives focus on roost protection through such actions as temporary closure of caves to entry and maintenance of agave habitats.

*The Sanborn's long-nosed bat feeds mainly on agave and saguaro flower nectar and pollen.*

This arboreal squirrel is grayish brown, tinged with rust coloration on its back. The ears are slightly tufted in the winter. The tail is bushy. It occurs primarily in the spruce-fir forest above 8,500 feet in elevation on the Pinaleno Mountains in southeastern Arizona. Fewer than 150 squirrels are now estimated to exist. Their diet consists primarily of conifer seeds. They store conifer seed-bearing cones in

## Mt. Graham Red Squirrel

*Tamiasciurus hudsonicus grahamensis*



caches known as middens, which they use for food during the winter. Development, logging and competition with the introduced tassel-eared squirrel appear to be the major reasons for its decline. It is a federal endangered species.

*The Mount Graham red squirrel occurs only in the Pinaleno Mountains, Coronado National Forest, in southwestern Arizona.*

## Desert Bighorn Sheep

*Ovis canadensis mexicana*



Bighorns are highly social animals. The sexes characteristically separate, then come together during the rut. They breed from July to December, the most prolonged breeding season of any North American ruminants. Single lambs are the rule. In desert regions where lack of moisture limits grass growth, shrubs and

*The desert bighorn is restricted by water availability.*

trees are the major foods. Desert bighorns are restricted in distribution depending on water availability. The cougar is the main bighorn predator. Parasites and disease are also significant mortality factors. Desert bighorn range declined drastically during the latter half of the nineteenth century. They are a sensitive species in the Southwestern Region.



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